Table 7: Time variations

Molar Ratio (ml)	NAOH (mg)	Temperature (^{0}c)	Time (hr)	Yield (%)
3:1	0.2	60	2	86.7
3:1	0.2	60	2.30	84.3
3:1	0.2	60	3	82
3:1	0.2	60	3.30	80.5

9. Conclusion

The objective of this project was to characterize the effect of oxidation on the exhaust emissions from a biodiesel-fueled engine. Based on the experimental results, the following final conclusions can be drawn.

The brake power of biodiesel was nearly the same as with diesel, while the specific fuel consumption was higher than that of petro diesel. Carbon deposits inside the engine were normal, with the exception of inlet valve deposits.

The engine performance of the oxidized and unoxidized biodiesels and their blends was similar to that diesel fuel with nearly the same thermal efficiency, but with higher fuel consumption reflecting their lower energy content.

Biodiesel fuels can be performance improving additives in compression ignition engines. Performance testing showed that while the power decreased and the brake specific fuel consumption increased for all of the biodiesel samples, compared diesel fuel, the amount of the changes were in direct proportion to the lower energy content of the biodiesel.

9.1 Carbon Monoxide Emission

Figure 6 shows the CO emission increases with for diesel and biodiesel. The biodiesel produces a high amount of carbon monoxide that diesel at all load condition. The highest value of CO at 25% blend of castor oil is 3.51% in respect to the value of 1.54% for diesel.

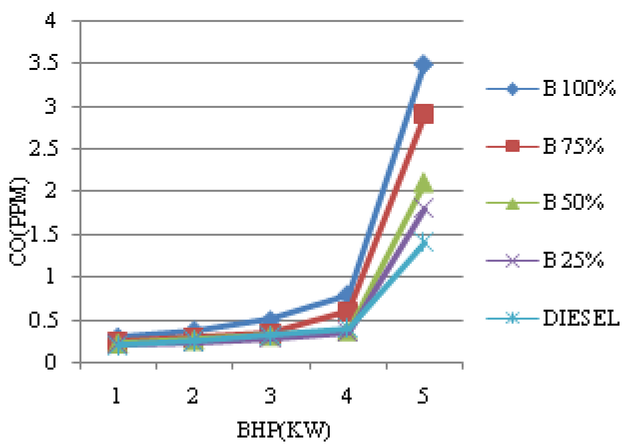

Figure 6: BHP Vs Carbon Monoxide

9.2 Unburnt Hydrocarbon Emission

Figure 7 shows the variation of unburnt hydrocarbon emissions with brake power output for castor oil and its blends with diesel in the test engine. Biodiesel shows considerably less HC emissions than diesel fuel. This should be than the availability of sufficient amount of oxygen in a biodiesel which enable the complete combustion when compared to diesel combustion. UHC of 25% blend of castor oil has lower emissions compared with all other blends. While, UHC of 25% and 50% blends of castor oil compared well.

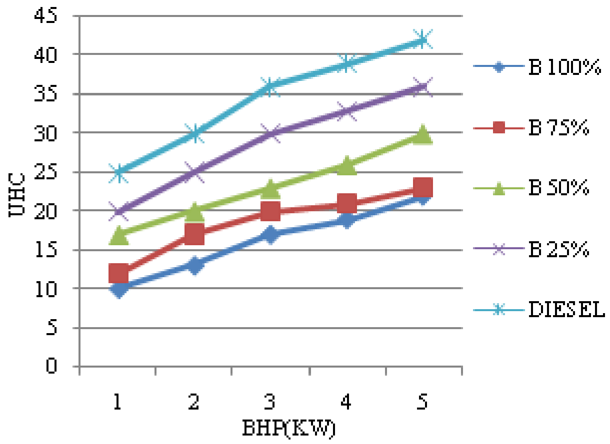

Figure7: BHP Vs Unburned Hydrocarbon

9.3 Smoke Emission

Figure 8 shows the variation of smoke emissions with brake power output for castor oil and its blends with diesel in the test engine. Diesel has higher smoke emission compared with all other blends of castor oil. 75% blend of the castor oil smoke opacity is well comparable with diesel. The smoke level for biodiesel is low compared to diesel at all loads, Reason due to the high oxygen content and lower sulphur content of biodiesel. Smoke of neat castor oil has lowest values compared with all other blends and diesel.

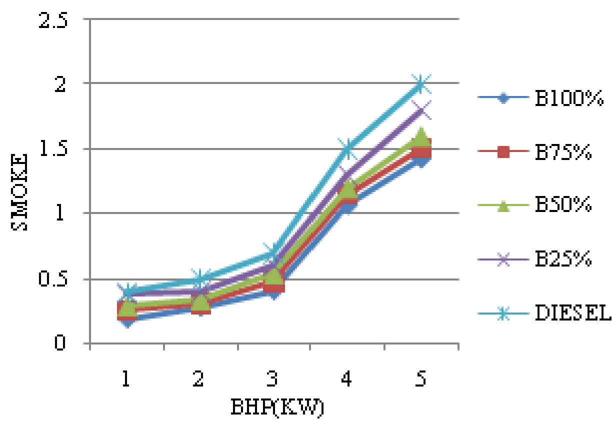

Figure 8: BHP Vs Smoke

9.4 NO_x Emission

Figure 9 shows the variation of nitrogen oxides emissions with brake power output for castor oil and its blends with diesel in the test engine. NOx of 25% blend of castor oil is slightly lower than that of diesel. Diesel has higher NOx emissions compared with all other blends throughout all operating loads. NOx emissions neat castor oil has maximum value at 81.95% of rated loads and exhibited lower emission rate compared with all other blends at all load. Generally NO_x emission higher for biodiesel compared to the diesel.

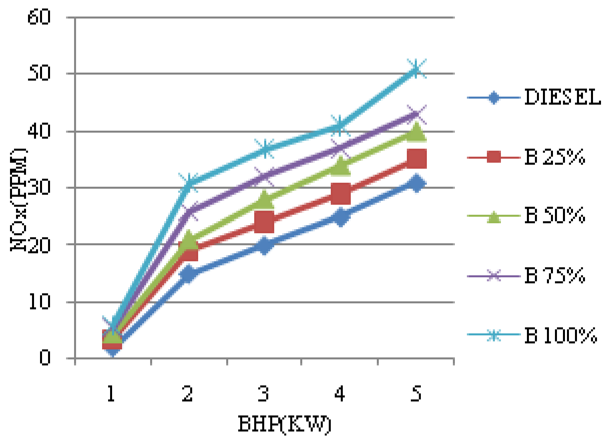

Figure 9: BHP Vs Oxides of Nitrogen

9.5 Brake Thermal Efficiency

Figure 10 shows the variation of brake thermal efficiency (BTE) with brake power output for castor oil and its blends with diesel in the test engine. Brake thermal efficiency of 25% blend of castor oil compared well with diesel and exhibited the highest value at 79.94% of total load. The maximum BTE at 25% blend of castor oil is 23.21% obtained at 4 Kw against the 24.3 %, for pure diesel.

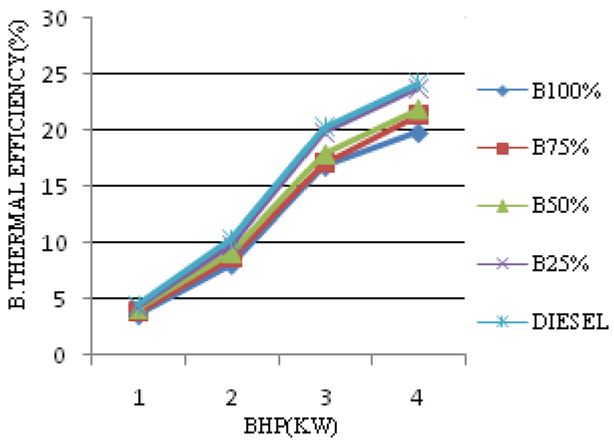

Figure10: BHP Vs Brake Thermal Efficiency

9.6 Brake Specific Fuel Consumption (BSFC)

Figure 11 shows the variation of brake specific fuel consumption with brake power output for castor oil and its blends with diesel in the test engine. Diesel has lower BSFC value compared with all other blends, whereas 25% blend of castor oil has lower BSFC values. At the maximum thermal efficiency load of 25% blend, the bsfc of castor oil is 0.342 Kg/Kw- hr, corresponding to the 0.281 value for diesel.

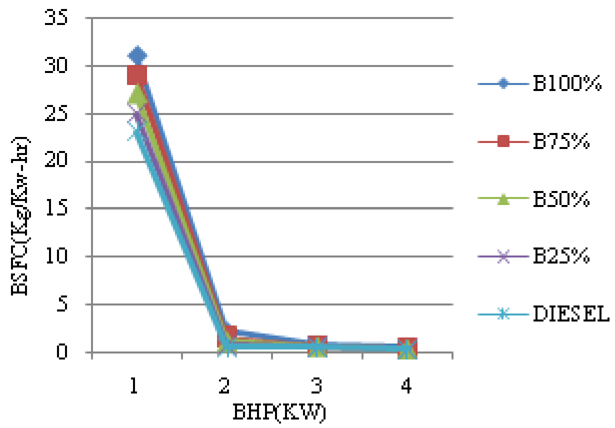

Figure 11: BHP Vs Brake Thermal Efficiency

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